



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/759,250

01/20/2004

Noriyuki Maekawa

503.43406X00

7074

20457

7590

12/01/2005

ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-3873

EXAMINER

PATEL, DHARTI HARIDAS

ART UNIT

PAPER NUMBER

2836

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

A

Office Action Summary	Application No. 10/759,250	Applicant(s) MAEKAWA ET AL.	
	Examiner Dharti H. Patel	Art Unit 2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4 and 5 is/are rejected.
- 7) ☐ Claim(s) 3 and 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/20/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-2 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukui, Patent No. 5,293,076, in view of Wright, Patent No. 6,120,005. With respect to claim 1, Fukui teaches a control apparatus for a vehicle equipped with an engine comprises a direct-current power supply 3, a power supply voltage detection means 5, a coil-equipped fuel injection valve 8, and a control unit 20 for controlling the fuel injection valve 8 as disclosed in Col. 3, lines 9-20 and Fig. 1.

However, Fukui fails to teach or suggest a fuel injection valve or an actuator having plurality of coils, and that the control unit outputs a changeover signal for changing the magnitude of the resultant inductance of the plurality of coils of the fuel injection valve in accordance with a power supply voltage detection vale sent from said power supply voltage detection means.

Wright teaches a dual coil fuel injector. The fuel injector device is said to operate the two coils 16 and 18 in such a way as to cause the resulting inductance to be changed or altered as disclosed in Col. 4, lines 35-45. Also, the fuel injector device is driven by switches.

Both teachings are related by being coil driven injectors or actuators.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wright, which teaches a dual coil injector having smart electronic switch which causes the resulting inductance to be changed, into the circuit of Fukui to be able to use a low-cost, standard electronic control unit having saturated switch drivers with performance injectors which require peak and hold drivers and to mix-and-match as the applications require, thus, power savings can also be realized.

With respect to claim 2, Fukui teaches that the control unit 20 sets a reference value of a power voltage and outputs a signal V as disclosed in Col. 3, lines 9-12. Wright teaches that the two coils 16 and 18 operate in such a way as to cause the resulting inductance to be changed or altered as disclosed in Col. 4, lines 35-45.

With respect to claim 4, Fukui teaches that the control unit 20 gets the signal V when a power supply voltage reference value has been set beforehand is reached. Wright teaches a plurality of coils 16 and 18 of the fuel injector device that operate in such a way as to cause the resulting inductance to be changed or altered as disclosed in Col. 4, lines 35-45.

With respect to claim 5, Fukui teaches that the control unit 20 effects control so that a current A is supplied to said plurality of coils of said fuel injector valve by constant-current limitation as disclosed in Col. 3, lines 14-19.

Allowable Subject Matter

2. Claims 3 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for indicating allowance of claim 3: Wright teaches that the fuel injection valve has at least two coils. Fukui teaches a control unit but does not disclose that the control unit outputs a connection changeover signal for connecting the plurality of coils in parallel to set the resultant inductances thereof to small values and for changing the plurality of coils to a series connection to obtain large resultant inductance values.

The following is an examiner's statement of reasons for indicating allowance of claim 6: Fukui teaches a direct-current power supply, a power supply voltage detection means, a coil-equipped fuel injection valve, a control unit for controlling the fuel injection valve, detecting that a voltage detected by the power supply voltage detection means has decreased to a value that has been set beforehand but does not disclose the control method that comprises the steps of creating a connection changeover signal of at least said two coils in response to said detection, changing the connection of the coils to reduce the resultant inductance thereof, and conducting controls so that the time-varying characteristics of total magnetomotive force are approximately maintained at the characteristics existing before the power supply voltage decreased.

Art Unit: 2836

3.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dharti H. Patel whose telephone number is 571-272-8659. The examiner can normally be reached on 8:30am - 5pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on 571-272-2800, Ext. 36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DHP
11/18/2005



PHUONG T. VU
PRIMARY EXAMINER